FRIEL-105

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

DANIEL D. FRIEL, SR., ET AL.

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FOR: PRECISION MEANS FOR SHARPENING AND CREATION OF MICROBLADES ALONG CUTTING EDGES

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DECLARATION OF DANIEL D. FRIEL, SR.

DANIEL D. FRIEL, SR., hereby declares:

1. I am one of the named inventors for the above identified application.

2. I received a Bachelor of Science degree in Chemical Engineering from Johns Hopkins University.

3. In 1942 I began my employment with E.I. DuPont de Nemours & Co. ("DuPont") when I worked on the Manhattan Project, University of Chicago, and

remained employed by DuPont until my retirement in 1982. The last position I held at DuPont was Worldwide Director Instruments Products Division.

4. Upon retirement from DuPont I founded and am now Chief Executive Officer of Edgecraft Corporation ("Edgecraft") which develops and markets lines of kitchen products. The original and largest selling lines of products relate to various types of sharpeners. From the start up of Edgecraft in 1985, Edgecraft now has more than 150 full-time employees and offers over 500 different products. Edgecraft is an innovator of various types of sharpeners, food slicers, waffle makers, beverage brewers and other products. Edgecraft's CHEF'SCHOICE® sharpeners enjoy a world-wide reputation in the industry for technical innovations and consistently high quality.

5. I am a named inventor on numerous United States and foreign patents and patent applications. This includes 22 U.S. utility patents and 10 U.S. design patents specifically for various types of sharpeners. The first patent I applied for relating to a sharpener was on March 12, 1984. I am also a named inventor on patents for other

products of Edgecraft and for many products invented while employed with DuPont.

6. I consider myself to be an expert in the field of sharpening devices.

7. There are three common techniques used for sharpening tools, such as knives, namely a) abrasive sharpening, b) steeling and c) skiving.

8. ABRASIVE SHARPENING - The intent in abrasive sharpening of fine edge knives is to obtain an edge structure that in cross-section is V-shaped or of modified V shape where the resulting edge is as geometrically perfect as possible. Abrasive sharpeners use abrasive stones, surfaces coated with abrasives or use shaped hardened abrasive surfaces intended to rapidly remove significant amounts of material, generally metal, from the plane of the edge facets that intersect to form the edge. Abrasive sharpeners may be considered as devices which use abrasive surfaces to create specific geometric shapes along or across the facets that create the sharpened edge by abrasively removing material from the facets along the knife blade edge.

9. STEELING - A second common technique is

"steeling". Although the perceptions of conventional steeling vary widely, it has been generally believed that a non-abrasive manual steel may be used to straighten the burr created by abrasive sharpening and to align the burr (which is an extension of the edge) with the central axis of the edge or to remove the burr. The conventional steel does not have an abrasive coating on its surface, but is constructed entirely of a hardened material. Explanations commonly found in the published literature to explain the action of the unguided manual steel (sometimes magnetized) are as follows:

a. Realigns and smooths the edge.

b. Realigns molecules along the blade's cutting edge.

c. Realigns the blade.

d. Magnet aligns metal molecules.

e. Eliminates microscopic curl caused by impact cutting.

f. Realigns the blade and is not actually sharpening.

g. Steels do not sharpen, they hone or straighten an edge that's gone out of "tune".

h. Reestablishes alignment of sharp edges knocked out of alignment or bent to one side with use.

I. Coaxes the edge back in place.

j. Does not sharpen but straightens out the curl and realigns edges.

k. Tones the blades.

1. Magnetized to remove burrs.

10. SKIVING - The skiving techniques involve forming a new edge by removing in entirety the surface of old facets and replacing them with new facet surfaces commonly created at a poorly defined angle. Skiving is described in the present application in the last paragraph of page 11 extending over to page 12. As explained in the specification, skiving sharpeners include those which utilize a very sharp edge or interdigitating sharp edged wheels or corners of hardened metal or ceramics. Skiving could be analogized to wood planing where in skiving, one stroke can remove an entire thin film of metal from the facet surface.

11. Before the time of my involvement in the development of sharpeners (at least as early as 1984) I have been aware of steeling techniques.

Until decades later at the time of the invention of the present application, however, it was not obvious to me that if a precision guide were associated with a hardened surface, such as the steels used in steeling techniques, and if the steeling angle could be consistently controlled stroke after stroke that a unique blade edge would be created, one having relatively uniformly sized and spaced microserrations; and that this type of edge could be recreated after being initially dulled from use. This was a surprising discovery because to the best of my knowledge there was no realization that a microserrated blade edge could be obtained by steeling. In that regard, as I pointed out above, the general intent of abrasive sharpeners is to obtain a perfectly geometric V-shape. The basic intent of manual steeling is generally believed to be to straighten or remove burrs that result from abrasive sharpening. The basic intent of skiving is to remove on each stroke an entire layer or film of metal. None of these techniques was intended to form a microserrated edge.

12. The present invention represents a unique

technique for sharpening. It is what we have described in the present application and claims as a "conditioning" apparatus in order to emphasize that this apparatus differs from both abrasive sharpening and conventional steeling and that the resulting edge is repeatedly reproducible and very different. The present invention differs from abrasive sharpening in that it does not utilize abrasive materials to achieve its result. Similarly, the present invention differs strikingly from steeling, as it has been practiced in the past, in that this invention incorporates highly precision means for controlling on every stroke the angle between the facet along the knife edge with the surface of a hardened material. It differs more fundamentally in that the present invention creates a novel, highly reproducible and unexpected row of microscopic serrations along the knife edge. The uncontrolled angles and inconsistent forces involved in conventional manual steeling prevents the consistent and reliable formation of this new highly desirable edge. Steeling has been used after the knife edge has been sharpened to straighten, realign and

smooth the edge, and also to remove burrs especially when magnetized. The present invention, in contrast, will create a relatively uniform and novel row of microscopic teeth along the edge and recreate those teeth when the edge is dulled from use. The physical phenomena responsible for the creation of these microscopic serrations or teeth along the knife edge is a carefully controlled and repetitive very localized bending of the edge back and forth along the abrasively sharpened edge especially after the burr is removed. This repeated bending in opposite directions causes stress hardening and embrittlement of the metal along the edge itself which causes cracks to occur perpendicular to the edge and fracturing of small sections of metal between the cracks so formed. Small sections of metal then fall off between the cracks leaving the tooth-like microscopic serrations along the edge.

13. The present invention is thereby based upon the ability to obtain a microserrated edge through the use of a precision guide for a hardened surface which does not have the characteristics of abrading, skiving and metal removing tools. In

order to achieve these results the present invention uses a combination of various features such as having the object with the hardened surface be static or non-motor-driven. In addition, the hardened surface is non-planar and of non-extended shape where it contacts the edge of the blade to locally stress and fracture the edge of the blade by repeated stroking to thereby result in a microscopic serration along the blade edge.

14. In rejecting the claims in the last Office Action, the Examiner concluded that it would have been obvious to use in the abrasive sharpener of my U.S. design patent Des. 368,217 ("Friel") a non-abrasive hardened object for the sharpening tool in view of Edling 4,285,253. I do not agree with this conclusion for a number of reasons. First of all there would be no motivation to make such a combination. In addition even if Friel were modified simply to use a hardened object of the same shape as Friel's abrasive sharpening tool, such combination would still not result in the present invention. It would not be obvious from Friel and Edling to further modify such

combination in order to result in the present invention and undue experimentation would be required to result in the present invention.

15. Friel (which is similar to my U.S. 5,390,431) discloses an abrasive knife sharpener which uses a pair of rollers as the guide structure. The abrasive sharpening tool is in the form of an extended abrasive coated V shape structure. (U.S. 5,390,431 shows the sharpening tool as a pair of elongated interdigitating abrasive members.) The purpose of the Friel sharpening tool is to form a V-shaped blade edge characteristic of what results from abrasive sharpeners. The sharpening tool is not of non-planar and non-extended shape and would not locally stress and fracture the blade edge by repeated stroking. This is not surprising because there is no intent to create a microserrated blade edge. Modifying the structure of Friel to create such an edge would be contrary to what in this instance is sought by Friel - namely, a nominally perfect blade edge of V-shape.

16. Edling describes a mechanical steel wheel for sharpening blades. The Edling device uses motor driven disks 11,24, each having a smooth

peripheral edge 12. The intent of the device is to sharpen "the blade to a smooth, fine finish" (Col. 3, lines 24-34) The Edling patent also discloses the provision of a "knife-guiding means 16" having a rounded edge 34. Clearly Edling does not suggest a precision contacting guide. The use of disks having rounded edges and non-contacting knife guiding means having rounded sides or edges is specifically stated by Edling to "enable the blade 18 being sharpened to be drawn through the knife receiving-spaces at a variety of angles instead of only at right angles to the disks 11 and 24, as would be required if no rounding was used" (Col. 4, lines 46-53) Figures 2 and 6 of Edling also illustrate the actual use of the Edling device where the knife blade 18 clearly does not have the blade face in contact with any guide surface and particularly with any planar guide surface. In contrast, the present invention uses a contacting precision knife guide in order to assure that when the face of the blade is moved across the planar guide surface the blade will be precisely at the same angle each and every time. Such precision guide is not possible with the

Edling device.

17. Among my patents relating to sharpeners are U.S. 5,611,726; 6,012,291; 6,113,476 and 6,267,652. Each of these patents discloses a truncated cone in combination with a guide member. In each of these patents, not only is the truncated cone an abrasive sharpening tool, but also the truncated cone is motor driven. There is no disclosure in any of these patents of reproducibly creating a uniformly microserrated blade edge and the structure of each sharpener would not create such an edge. Accordingly, these patents provide no guidelines for suggesting features that might be used for obtaining a microserrated blade edge.

18. The features of the invention I have described above would not have been obvious to a person of ordinary skill in the art for various reasons. At the outset, one of ordinary skill in the art would not have been aware that a microserrated knife blade edge could even be obtained. In addition, because the various sharpening techniques, such as in Friel and Edling, have distinctly different purposes, there would have been no motivation and therefore it would not have been obvious to

combine features of one type of technique (such as a precision knife guide used in abrasive sharpening) with features of other techniques, such as using a substantially non-abrasive hardened surface, much less a hardened surface which is static or non-motor-driven (Edling's sharpening disks are motor driven) in order to create the microserrated edge upon repeated stroking at precisely the same controlled angle. Having the hardened surface object non-motor-driven is important. In that regard, even if the hardened surface were nominally smooth, it inherently would have some imperfections which could create some abrasive action when motor driven and thereby not obtain the desired microserrated edge. It also would not have been obvious that such hardened surface should be of a shape which would locally stress and fracture the edge of a blade at the location of contact by the repeated stroking. Such hardened surface should thereby be of non-planar and non-extended shape. Preferred shapes would be arcuate such as the hardened surface of a cylinder. Stated another way if Edling is being relied upon simply for a

suggestion of making the abrasive surface of Friel smooth, then such surface would not be of non-planar and non-extended shape so as to locally stress and fracture the blade edge. If, on the other hand, the entire Edling hardened surface disk were being substituted for the abrasive sharpening tool of Friel, the hardened surface would not be static or non-motor-driven because the Edling disks 11 and 24 are driven by motor 14. In addition, Edling requires his motor driven disks to be associated with knife guiding means 16 which have rounded sides or edges 34 and do not provide a precision guide having a planar guide surface. As a result, even if Friel and Edling were combined, such combination would not produce a microserrated edge and would structurally differ from the present invention.

19. It is also my opinion that undue experimentation would be required by one of ordinary skill in the art to result in the invention of this application. In that regard, because obtaining a highly regular microserrated edge was not, to the best of my knowledge, even known and certainly any means of predictably achieving such an edge was

unknown, there would be no reason for one of ordinary skill in the art to begin any form for experimentation to determine what combination of features would be necessary to create such a microserrated edge. For much the same reasons as to why the invention would have been unobvious, there would be no motivation to direct one of ordinary skill in the art as to how to experiment in order to obtain the combination of features that is involved with this invention. The various features described above with respect to this invention cooperate to create the microserrated edge. Since the prior art does not provide any suggestions as to how such an edge might be created, undue experimentation would not only be required, but any expectation of creating such on edge would be completely unreasonable. The fact that a highly regular microserrated edge could be produced was a total surprise to me. The prior art could not provide any guidelines for obtaining a type of edge that was not even being sought by the conventional sharpening techniques.

20. In summary, if Friel were being modified in view of Edling to have the planar sharpening member of

Friel smooth instead of abrasive, the sharpening member would still not be of non-planar and non-extended shape which would locally stress and fracture the blade edge. Experimentation would be required on how to modify the shape of the Friel sharpening member to create a microserrated blade edge. Since obtaining a microserrated blade edge was not a goal of the Friel sharpener, such experimentation would be undue experimentation and would also be unreasonable and unobvious because there would be no motivation to change the shape of the Friel sharpening member to obtain a type of blade edge not intended by Friel. Conversely, if Friel were being modified in view of Edling to substitute the entire Edling sharpening tool (smooth motor driven disks) for the Friel sharpening tool, such substitution should also include the imprecise non-contacting Edling guide having rounded sides since Edling uses the disks with rounded edges "in conjunction with the rounded sides 34 of the knife-guiding means" to achieve his intended results. (Col. 4, lines 46-53) Experimentation would be required to ultimately change the disks from being motor

driven to being static (non-motor-driven) and to ultimately change the guide from one having rounded edges to a precision guide having a planar guide surface in order to create a microserrated blade edge. Such experimentation would be undue experimentation and would be unreasonable and unobvious since there would be no motivation to experiment on making changes to a combined Friel/Edling device in order to achieve a microserrated blade edge when neither Friel nor Edling has that type of blade edge as its goal.

21. The present invention is embodied in Edgecraft's Model 470 and Model 130. At the time of its introduction to the trade in April 2004 there were no other products on the market having a steeling type sharpening member in combination with a precision guide in the manner of this invention and of commercial Models 470 and 130, despite the fact that steeling devices have been ubiquitous and the fact that abrasive sharpeners having precision guides were known for many many decades. Since the time of its first shipments in July 2004, Edgecraft has sold a total of approximately 10,000 collectively of these Models 470 and 130 products in the United States and Europe.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

dated: 8/10/05

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